

Improving AFOTEC's Contribution to the Acquisition Process: Moving Integrated Developmental and Operational Test to the Next Level

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The Air Force Operational Test and Evaluation Center (AFOTEC) has aggressively moved forward over the last 12 months, institutionalizing early influence and is now influencing concepts, projects, and programs earlier than ever before. In addition, AFOTEC's Space Test Initiative (STI) has taken hold in space acquisition and is proving to better support the acquisition and operational decision makers for space systems. The STI is now the prescribed method for space operational test and evaluation (OT&E) and has transformed space test policy through collaboration between AFOTEC and the space community.

Most recently, we are working to address the processes to successfully execute integrated developmental and operational testing (IDT/OT) across all programs to take advantage of available efficiencies by sharing operationally relevant data and "buying down" dedicated OT&E time and asset costs when able. Finally, we have launched a new effort aimed at improving how we conduct OT&E for heavily software dependent capabilities. We have called our newest effort the Cyberspace Initiative.

Early influence: 1 year later

AFOTEC defines "early influence" OT&E activities as those occurring prior to milestone A or key decision point A, beginning with high performance teams (HPT). At these points in the acquisition timeline, there is a great opportunity to substantially influence capability requirements and acquisition strategies before they are approved by the *Air Force*

Requirements for Operational Capabilities Council (AFROCC).

Within AFOTEC, we moved leadership of early influence from an exclusively headquarters function to shared execution with the detachments. Program expertise and test execution reside in AFOTEC's detachments, and they now lead OT&E early influence in their respective focus areas with support from the headquarters. We also placed liaison officers (LNOs) in the Air Force Materiel Command product centers and the Pentagon to help identify early influence opportunities. The LNOs identify program managers for emerging programs as they are initiated and connect them with the appropriate test director in our detachments. We will complete our LNO manning by placing

personnel at the Air Armament Center at Eglin Air Force Base (AFB), Florida, and the Space and Missile Systems Center at Los Angeles AFB, California, in July 2009.

AFOTEC has an early and active role in the Air Force Requirements Policy and Process Division HPTs that develop the capability requirements documents used throughout the life of a program. In fact, we recently helped Air Force Materiel Command make HPT involvement by their developmental testers mandatory to better identify test capability challenges early in a program. AFOTEC also advocated for all Major Commands (MAJCOMs) to invite Air Education and Training Command personnel to all HPTs to facilitate consideration of training issues and capabilities as part of the requirements for all programs.

From Initial Capability Documents (ICD) forward, AFOTEC participates in requirements refinement.



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Using the Space Command and Control ICD review by the Integrated Test Team (ITT) as an example, AFOTEC identified 25 substantive comments during ICD preparation. As part of the ITT, our review helped refine requirements, ensuring they were testable, measureable, and operationally relevant. Several of the comments addressed parameters that limited design latitude with little operational foundation. Getting requirements documentation correct early improves the chances of successfully integrating developmental and operational testing to favorably affect the cost, schedule, and performance of a program by ensuring that realistic requirements are established and IDT/OT opportunities are identified. Additionally, early collaboration provides program office and developmental testers a look at the major factors affecting the “open book” test that operational testers will ultimately plan and execute.

In just the last 12 months, AFOTEC formally coordinated over 55 capability requirements documents. Of these documents, 38 were Joint Capabilities Documents (JCDs), ICDs, and capability development documents. JCDs are the earliest of these documents, developed prior to the functional solution analysis. JCDs are also written before experimentation or the selection of a material approach, before an acquisition category is assigned, and before Office of the Secretary of Defense, Director of Operational Test and Evaluation (DOT&E) oversight decisions are made. AFOTEC reviews these early capability documents for operational relevance, measurability, and testability.

We recently worked to ensure early OT&E influence is institutionalized in the Air Force and the Department of Defense (DoD) instructions and guidance. Specifically, we codified early influence concepts in DoD Instruction 5000.02, *Operation of the Defense Acquisition System*, and Air Force Instruction (AFI) 99-103, *Capabilities Based Test and Evaluation*. We are also ensuring that the guidance is contained in the Defense Acquisition Guidebook.

In the last year, AFOTEC executed 20 initial test design efforts using core teams with both internal and external participation. Core team representation includes users, program offices, developers, responsible test organizations, and DOT&E.

AFOTEC also exerts significant early influence in the form of early operational assessments (EOAs) of programs because they are planned and executed prior to milestone B or key decision point B. EOAs address capability and programmatic progress in terms of likely performance shortfalls, programmatic and documentation voids, and readiness for initial operational test and evaluation (IOT&E). EOAs provide invaluable insights to the using MAJCOM and the program office

to use in their trade-off decision process when changes are often less costly and more timely.

The Space Test Initiative

The AFOTEC-led STI is now space test policy. In July 2008, AFOTEC hosted the first Air Force Space Operational Test and Evaluation Summit at Kirtland AFB, New Mexico. Senior leaders from AFOTEC, Under Secretary of the Air Force Directorate of Space Acquisition, National Geospatial and Intelligence Agency, Air Force Space Command (AFSPC), Space and Missile Systems Center, and the Air Force Research Laboratory gathered to discuss STI and focused on creating a new space testing model for OT&E. The summit participants moved away from a process that resembled “standardization and evaluation” after launch or fielding, to a process of early and continuous involvement throughout the development and fielding of a new space-enabled capability. The three key elements of STI are early and continuous involvement and integrated testing, agile analysis and reporting, and system-of-systems evaluation.

Our new space OT&E model is endorsed well beyond the Air Force and provides a space system testing process tailored to the space acquisition model. Importantly, our space OT&E model now provides decision quality data to the space acquisition and operational decision-makers in a timely and accurate manner.

When AFOTEC's Detachment 4 at Peterson AFB, Colorado, tested the Space-Based Infrared System (SBIRS) Highly Elliptical Orbit payload (HEO-1) and operations center, they combined IDT/OT with agile reporting to accelerate HEO-1 operations by 6 weeks. The key enabler reducing time and cost for the Operational Utility Evaluation (OUE) was Detachment 4's leveraging of Lockheed Martin's planned developmental testing period to also achieve operational testing objectives. Detachment 4 also leveraged system trial period operations to further execute and report on the OT&E. Using agile reporting, AFOTEC informed the AFSPC HEO-1 operational acceptance decision and further enabled a U.S. Strategic Command system certification 8 weeks early (*Figure 1*). AFOTEC is preparing to test a second HEO payload simply known as HEO-2. Although the HEO-2 program had not originally planned to conduct operational testing early in the program, AFSPC is capitalizing on the HEO-1 momentum created by AFOTEC's new space OT&E model and is accelerating HEO-2 transition into the SBIRS constellation. Subsequent operational testing and reporting will further accelerate HEO architecture operational acceptance and employment of warfighting capabilities.

AFOTEC drafted the new Chapter 8 for AFI 99-103, *Capabilities Based Test and Evaluation*, to reflect the new space OT&E model. Furthermore, AFOTEC hosted a meeting in December 2008 to draft an annex to National Security Space Acquisition Policy 03-01 (NSS 03-01), incorporating the space OT&E model and aligning NSS 03-01 with AFI 99-103. With the cancellation of NSS 03-01, the information in the draft annex will be proposed as an appendix to DoD Instruction 5000.02.

Overall, the new space OT&E model enables better space warfighting capability acquisition through early and continuous integrated testing to ensure that systems address mission capability gaps, and enables early user and program office trade-off decisions when changes are less costly and more timely.

Integrating DT and OT

The test community can often positively affect a program's cost-schedule-performance problems by making better use of limited resources to eliminate unnecessary duplication of test events, better assure systems are ready for operational testing, and reduce the

overall time required for dedicated operational testing. Integration of developmental testing and operational testing improves efficiency and, in many cases, allows us to reduce the cost of dedicated OT&E. Early influence is essential to successful IDT/OT for all programs.

The Air Force is leading the way in IDT/OT planning through participation in HPTs and ITTs. Working with the DT community provides early access to data critical to our operational assessments. Our participation in the HPTs and ITTs is the key to setting the conditions for the most effective IDT/OT. The AFOTEC and program office leaders cochair the ITT and therefore, can ensure the access to data.

At AFOTEC, we are making IDT/OT a requirement for all programs. Successful IDT/OT needs three things: early and continuous collaboration between the warfighter (user), acquisition, and T&E communities; OT&E plans informed by DT execution; and acknowledgment by the Program Element Officer (PEO) and appropriate DT wing commander of the dependency of the OT&E plan on planned DT execution.

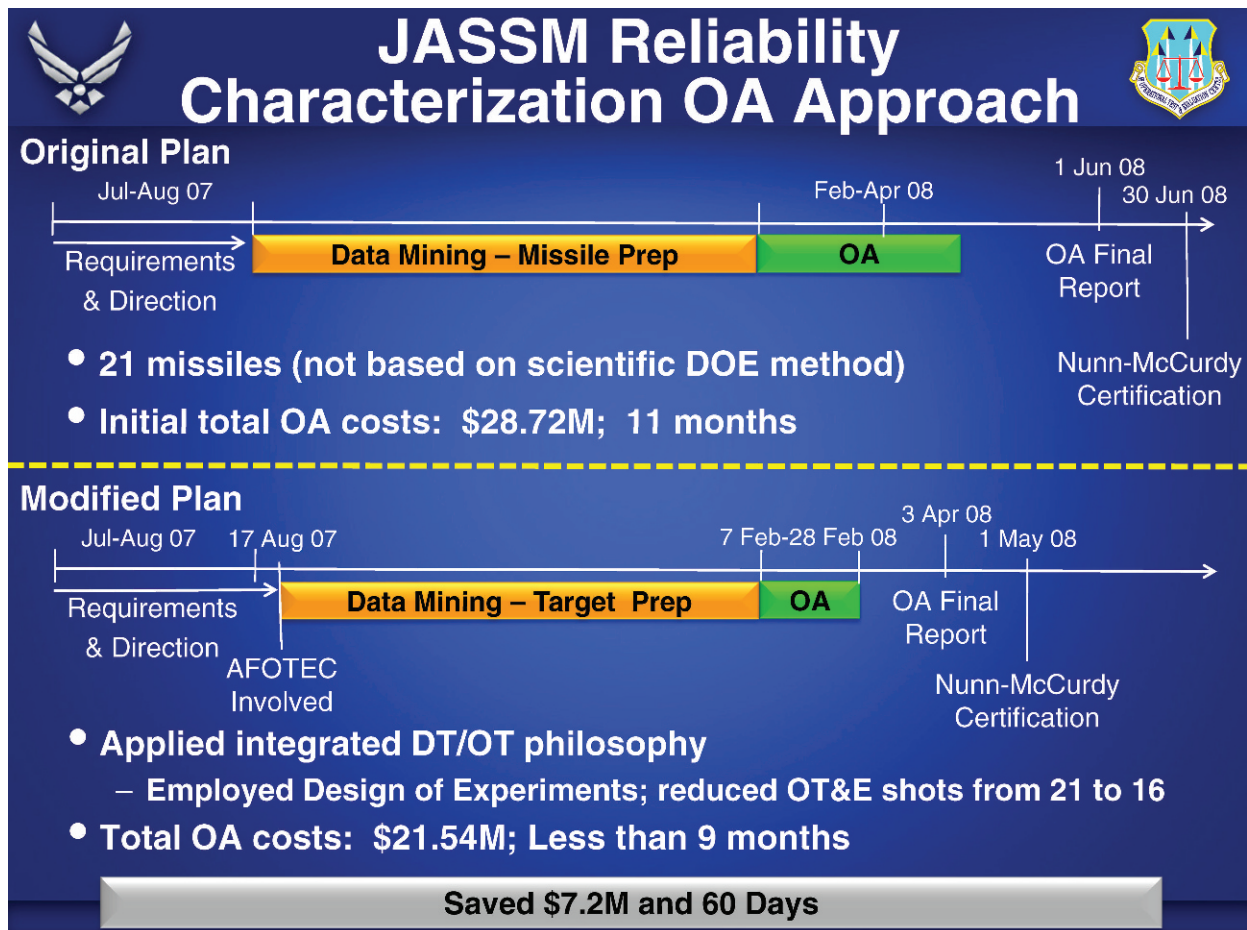


Figure 2. Joint air-to-surface standoff missile integrated DT/OT example.

Integration is where we are going in acquisition and test. It makes sense to use operationally relevant data generated by the developer and the developmental tester to “buy down” OT&E where able. Successful integration requires identifying data requirements for OT&E and providing access to the data in program contracts. Operational testers are now involved in the request for proposal (RFP) development process to help developers understand data sharing requirements early on.

By employing IDT/OT, the operational testers assume greater risk than in the past. Rather than waiting for the PEO to certify a program’s readiness for IOT&E, we now build our plans earlier and work to define the point at which DT systems are “production representative.” We also help identify when to put the system into more operationally realistic scenarios so we can gather operationally relevant data early, allowing us to “buy down” dedicated OT&E in terms of cost and time.

After we have scoured the DT plans to find areas of overlap and duplication, we will build an OT&E plan

that accounts for the operationally relevant DT data. We then send our OT&E plan to the PEO and DT wing commander for acknowledgment that our plan depends on DT execution as planned and the resultant data.

IDT/OT was one of the focus areas of the February 2009 Air Force Test and Evaluation Days we hosted in Albuquerque, New Mexico. The conference panels generated a great deal of discussion on the subject, and the conference working groups further developed their ideas to produce a draft white paper entitled: *Prescribed Process for Integrated DT/OT*. The processes developed in the white paper will also support our work with the entire test community to amend the range of DoD and U.S. Air Force instructions that will enable better integrated test and evaluation.

Early integrated DT/OT success stories

Though work remains to be done to further refine the processes enabling more effective IDT/OT, we demonstrated notable successes in our application of IDT/OT. The following examples illustrate some of

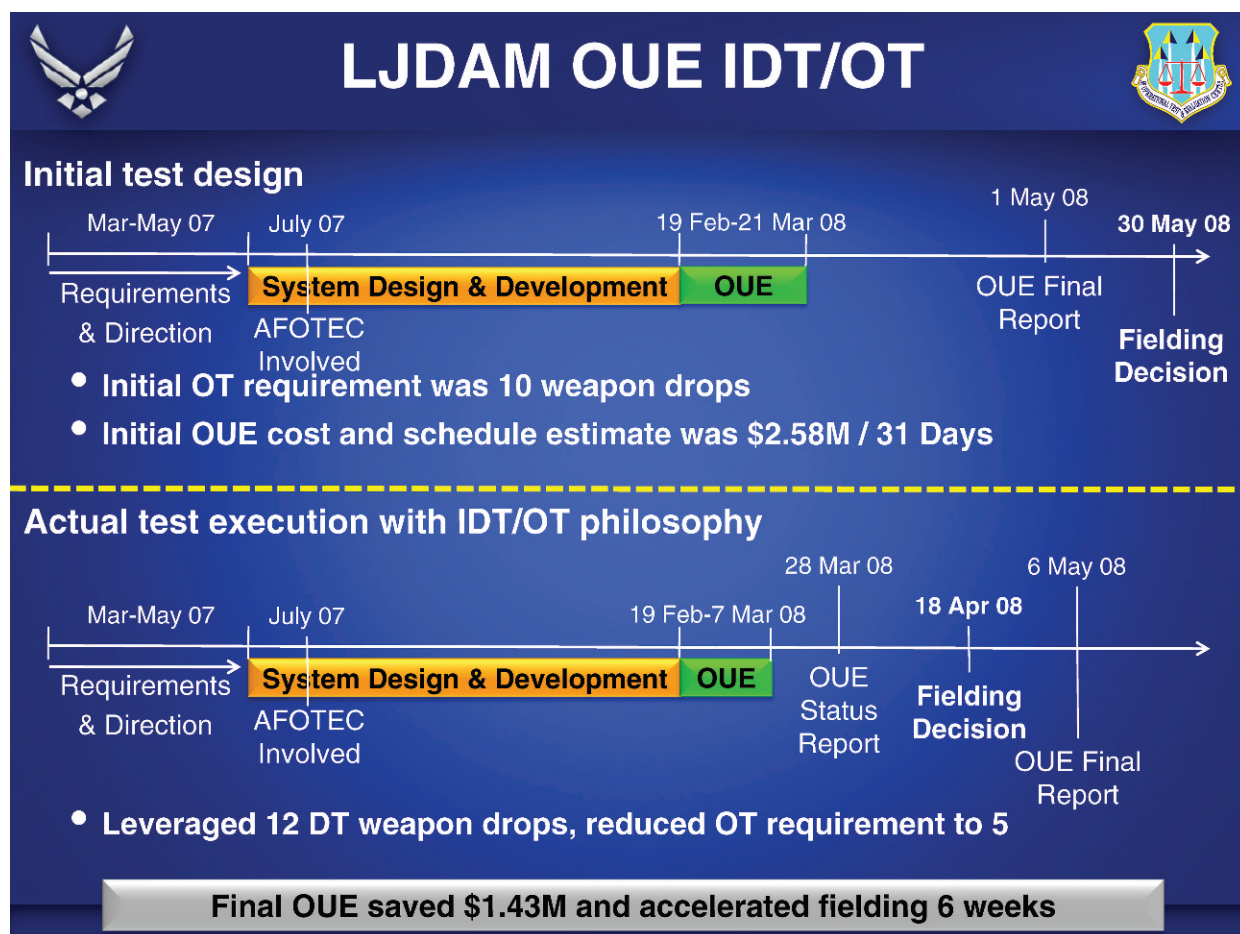


Figure 3. Laser JDAM example.

the efficiencies gained by working closely with the user, developer, and developmental testers. Early efforts ultimately reduce acquisition risk and accelerate warfighting capabilities to the warfighters.

The first example involves AFOTEC's Detachment 2 at Eglin AFB, Florida. AFOTEC testers worked with the system program office and developer on the Joint Air to Surface Stand-Off Missile reliability characterization operational assessment (OA) (Figure 2). The Undersecretary of Defense (Acquisition, Technology and Logistics) directed the Air Force to conduct a reliability characterization program prior to Nunn-McCurdy certification hearings as a result of several weapon failures during the April 2007 Weapon System Evaluation Program.

The original plan was not based on scientific design of experiments (DOE) methods and called for 21 missiles at a cost of more than \$28 million and required 11 months to complete. We then applied DOE and used the data from several DT delivered weapons under our IDT/OT approach and reduced the number of dedicated OT&E weapons to 16. The IDT/OT

plan reduced the OA costs to approximately \$21.5 million and took less than 9 months to complete. IDT/OT and the use of DOE allowed us to save more than \$7 million and informed the Nunn-McCurdy certification hearing 60 days earlier than originally planned.

Another successful IDT/OT event also involved AFOTEC Detachment 2 testers working with the DT community in a successful Laser Joint Direct Attack Munition (JDAM) Operational Utility Evaluation (OUE) (Figure 3).

The Air Combat Command (ACC) asked AFOTEC to conduct an OUE on the Laser JDAM, an urgent operational need program addressing the capability to engage moving targets with JDAM. The initial test plan was based on DOE and required 31 days and 10 weapons to execute an adequate evaluation. We then applied an IDT/OT approach and leveraged 12 production representative DT weapons employment events. AFOTEC testers were able to augment and complement data from the DT drops using only five dedicated OT&E weapons. The impact of the approach resulted in a savings of five Laser

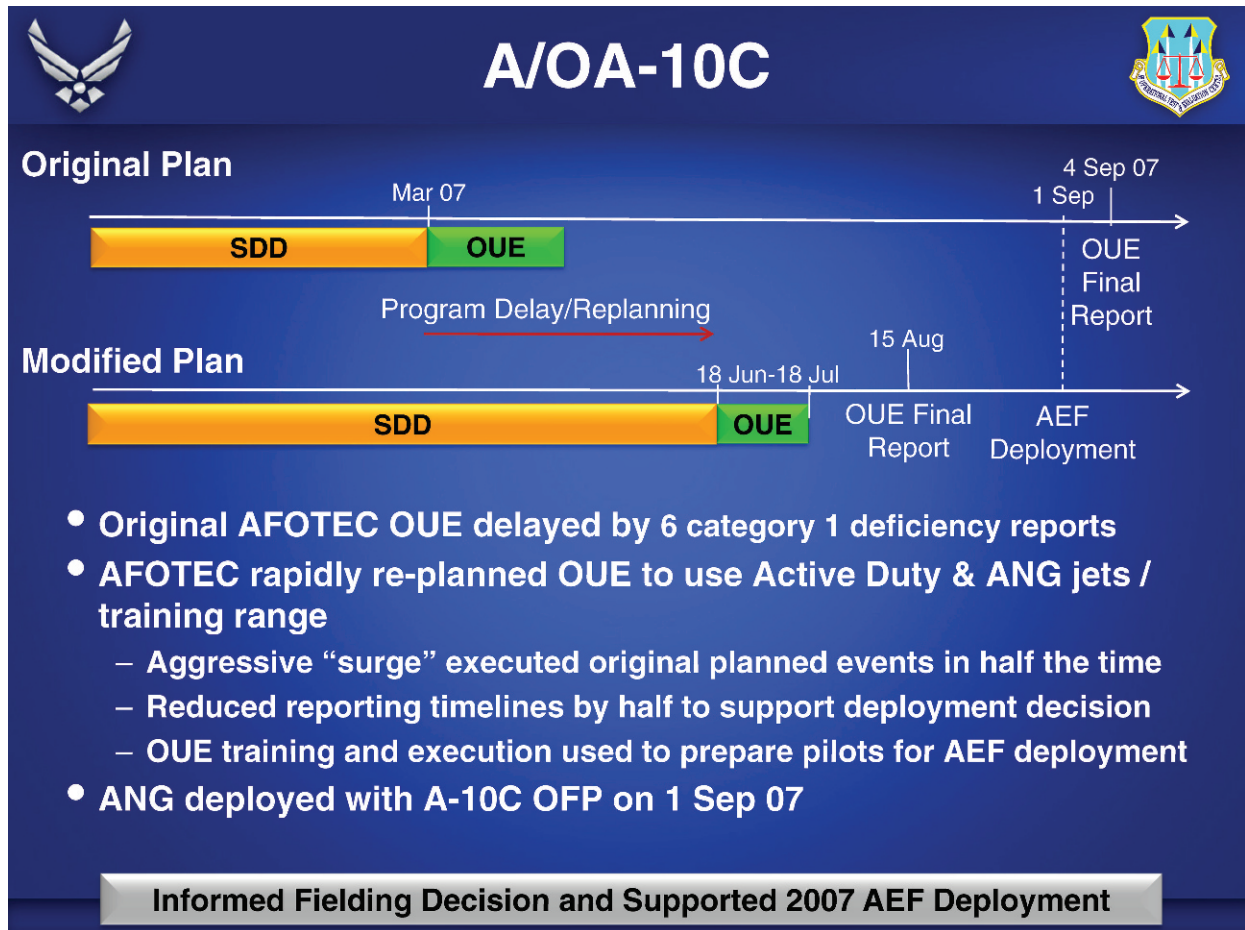


Figure 4. A/OA-10C example.

JDAMs valued at nearly \$300,000 each or \$1.43 million, as well as completing the OUE 14 days ahead of schedule. The accelerated reporting provided early, relevant information to the ACC decision maker and enabled an April 18, 2008, fielding decision. By May 2008, the weapons were being loaded on 332nd Air Expeditionary Wing aircraft at Joint Base Balad, Iraq. Airmen from the 77th Expeditionary Fighter Squadron, flying F-16 Fighting Falcons, successfully employed the first Laser JDAM August 12, 2008, against a moving enemy vehicle in the Diyala province in support of a Combined Iraqi army and U.S. Marine Corps operation.

“This first employment represents a great step in our Air Force’s ability to deliver precise effects across the spectrum of combat,” said Lt. Gen. Gary L. North, the U.S. Air Forces Central commander and U.S. Central Commands Combined Force Air Component commander in an August 2008 interview with Deagel.com. “The first combat employment of this weapon is the validation of the exacting hard work of an entire team of professionals who developed, tested and fielded this weapon on an extremely short timeline, based on an urgent needs request

we established in the combat zone.” The total time from concept to employment was only 17 months.

Another successful IDT/OT event was the A/OA-10C OUE conducted by AFOTEC’s Detachment 6 at Nellis AFB, Nevada. The original plan was to complete the OUE in March 2007 using jets from Davis-Monthan AFB, Arizona, and the Goldwater Range. However, during DT/OT, AFOTEC, ACC, and the System Program Office determined that, with six Category 1 Deficiency Reports, the Operational Flight Program was not ready for the OUE.

AFOTEC stayed engaged and committed to making the original August 1, 2007, fielding decision and subsequent September 2007 Air Expeditionary Force deployment by using a variety of IDT/OT data sharing techniques. AFOTEC’s Detachment 6 testers replanned the OUE to use Nellis active duty and Maryland Air National Guard crews and jets on the Nevada Test and Training Range during the June to July 2007 timeframe. The Maryland ANG also used the spin up for the OUE to train and prepare for their September 2007 deployment (Figure 4).

AFOTEC executed an extremely aggressive test schedule and report process. On August 1, 2007, the ACC commander decided to field the A/OA-10C, and the stage was set for the Maryland ANG to deploy on schedule. The Maryland ANG was the first unit to deploy with the A-10C and engage in combat operations. The first JDAM employed from the A-10C resulted in a direct hit on an insurgent safe house in Iraq.

Way ahead

As we developed the STI, we saw many similarities in the test and evaluation of cyberspace systems where we often conducted OT&E after fielding, providing limited value to acquisition decision makers for software intensive systems. To improve test and evaluation for cyberspace systems, we will stand down our Kirtland-based Detachment 3 and combine our cyberspace system expertise with Detachment 4 (space) and Detachment 2 (command, control, and communications systems).

AFOTEC will lead a cyberspace test working group and a summit to apply the same level of rigor to cyberspace OT&E as we did to space. Our goal is to produce a cyberspace OT&E model that better aligns with the acquisition strategies for these systems. Our cyberspace efforts are directly in line with the Air Force's current integration of cyber and space.

Summary

AFOTEC demonstrated the value of the new space OT&E model, early influence, and IDT/OT over the past year. Most importantly, we successfully codified and institutionalized early influence and IDT/OT as well as our new space OT&E model across the U.S. Air Force and DoD.

New levels of communication and coordination are enabling IDT/OT and resulting in significant cost and time savings for programs. Early and continuous communication between all players on the acquisition team, including the program office, the developer, the user, and the OT&E organization is the key to success. □

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